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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/803,819	03/13/2001	Teruhiko Hagiwara	7420-081-999	1331

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EXAMINER
FEICK, EMILY

ART UNIT	PAPER NUMBER
2862	

DATE MAILED: 06/11/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/803,819	HAGIWARA, TERUHIKO	
	Examiner	Art Unit	
	Emily J. Feick	2862	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-28 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-28 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Drawings

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference sign(s) not mentioned in the description: Figures 3 and 6 contain the reference character "z" but are not explained in the description. Correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 1-9, 17, 25, and 27 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

As to claim 1, reference is made to a method for measuring the attributes of materials containing a fluid state. It is unclear what type of measuring made, what type of attributes are being measured, what type of materials the measurement is being performed on. Since claims 2-9 are dependent on the rejected claim they are rejected as well.

As to claims 8, 17, 25, and 27, reference is made to ϕ (T_2) which is defined in the claims as the porosity corresponding to the exponential decay time T_2. However since there are several types of porosity it is unclear which type of porosity the applicant is referring to.

Claim Rejections - 35 USC § 102

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1, 2, 4-11, 13-19, 21- 28 are rejected under 35 U.S.C. 102(b) as being unpatentable by U.S. Patent No. 6,005,389 to Prammer.

As to claim 1, Prammer discloses a method for measuring an indication of attributes of materials containing a fluid state comprising the steps of: providing a time-domain signal indicative of attributes of said materials in a signal measurement (col.3, lines32-36; Figure 8A; Figure 9B); constructing a time-domain averaged data train (col.4, lines 3-6; col.4, lines18-21), the averaging being performed over one or more time intervals Δ_i (Figure 2, Figure 5, col.8, lines 12-18); computing an indication of the attributes of said materials from the time domain averaged data train (col. 4, lines 18-21).

In reference to claim 2, Prammer discloses the method of claim 1 wherein said one or more time intervals Δ_i are constant (col. 8, lines 12-18).

As to claim 4, Prammer discloses a method as in claim 2 wherein the following expression is used to construct the time-domain averaged data train: $S_\Delta(t)=\int_t^{t+\Delta} dt` S(t`)/\Delta$ (col. 11, equation 5).

As to claim 5, Prammer teaches the method of claim 1 wherein the time interval Δ_i is fixed and the time-domain averaged data train is constructed at times $t = t_0, t_0 + \Delta, t_0 + 2\Delta,\ldots, t_0 + N\Delta$ (col. 8, lines 12-18).

In reference to claim 6, Prammer teaches the method of claim 1, wherein the time-domain signal is an NMR echo train (Figure 8A, Figure 9B).

In reference to claim 7, Prammer discloses the method of claim 6 wherein the step of computing an indication of attributes is performed using inversion of the constructed time-domain averaged data train into T_2 domain (col. 9, lines 25-40).

As to claim 8, Prammer discloses the method of claim 7, wherein the T_2 distribution is estimated using the following expression: $S_\Delta(t) = \Sigma_{T2}\, \phi(T_2) \exp(-t/T_2)(1-\exp(-\Delta/T_2)) + \text{Noise}$ (col. 10, equation 3).

In reference to claim 9, Prammer discloses the method of claim 1 further comprising the step of averaging two or more constructed time-domain averaged data trains to increase the signal-to-noise ratio of the measurement (col. 5, lines38-42; col. 11, lines 24-32).

As to claim 10, Prammer discloses a method for measuring an indication of attributes of materials containing a fluid state comprising the steps of: providing an NMR echo-train indicative of attributes of materials along the borehole (col.3, lines32-36; Figure 8A; Figure 9B); constructing a time-domain averaged data train (col.4, lines 3-6; col.4, lines18-21), the averaging being performed over one or more time intervals Δ_i (Figure 2, Figure 5, col.8, lines 12-18); computing an indication of the attributes of said materials from the time domain averaged data train (col. 4, lines 18-21).

In reference to claim 11, Prammer discloses the method of claim 10 wherein said one or more time intervals Δ_i are constant (col. 8, lines 12-18).

In reference to claim 13, Prammer discloses the method of claim 10 further comprising the step of averaging two or more constructed time-domain averaged data trains to increase the signal to noise ratio of the measurement (col. 5, lines38-42; col. 11, lines 24-32).

As to claim 14, Prammer teaches the method of claim 10 wherein the following expression is used to construct the time-averaged data train: $Echo_{\Delta}(t)=\int_{t}^{t+\Delta}dt`Echo(t`)/\Delta$ (col.11, equation 4).

As to claim 15, Prammer teaches the method of claim 10 wherein the time interval Δ_i is constant and the time-domain averaged data train is constructed at times $t = t_0, t_0 + \Delta, t_0 + 2\Delta,\ldots, t_0 + N\Delta$ (col. 8, lines 12-18).

In reference to claim 16, Prammer discloses the method of claim 15, wherein the step of computing an indication of attributes is performed using inversion of the constructed time-domain averaged data train into T_2 domain (col. 9, lines 25-40).

As to claim 17, Prammer teaches the method of claim 16 wherein the T_2 distribution is estimated using the following expression $Echo_{\Delta}(t) = \Sigma_{T2} \text{ø} (T_2) \exp(-t/T_2)(1-\exp(-\Delta/T_2))$ +Noise (col.10, equation 3).

As to claim 18, Prammer discloses a method for increasing the spatial resolution of NMR logging measurements, comprising the steps of: providing an NMR echo-train indicative of attributes of materials of interest (col.3, lines32-36; Figure 8A; Figure 9B); and constructing time-domain averaged data train from said echo train (col.4, lines 3-6; col.4, lines18-21), the averaging being performed over one or more time intervals Δ_i (Figure 2, Figure 5, col.8, lines 12-18).

In reference to claim 19, Prammer teaches the method of claim 18 wherein at least two or more time intervals are constant (col. 8, lines 12-18).

In reference to claim 21, Prammer teaches the method of claim 18 further comprising the step of averaging two or more constructed time-domain averaged data trains to increase the signal-to-noise ratio of the measurement (col. 5, lines38-42; col. 11, lines 24-32).

As to claim 22, Prammer teaches the method of claim 18 wherein the following expression is used to construct the time-averaged data train: $Echo_{\Delta}(t)=\int_t^{t+\Delta} dt` Echo(t`)/\Delta$ (col.11, equation 4).

As to claim 23, Prammer teaches the method of claim 18 wherein the time interval Δ_i is constant and the time-domain averaged data train is constructed at times $t = t_0, t_0 + \Delta, t_0 + 2\Delta,\ldots, t_0 + N\Delta$ (col. 8, lines 12-18).

In reference to claim 24, Prammer discloses the method of claim 23 wherein the step of computing an indication of attributes is performed using inversion of the constructed time-domain averaged data train into T_2 domain (col. 9, lines 25-40).

As to claim 25, Prammer teaches the method of claim 24 wherein the T_2 distribution is estimated using the following expression $Echo_{\Delta}(t) = \Sigma_{T2} \phi (T_2) \exp(-t/T_2)(1-\exp(-\Delta/T_2)) +Noise$ (col.10, equation 3).

As to claim 26, Prammer discloses a method for real-time processing of NMR logging signals comprising the steps of: providing real time data corresponding to a single event NMR echo train indicative of physical properties of materials of interest; constructing a time domain averaged data train from said NMR echo train, the averaging being performed over time interval Δ using the expression $S_{\Delta}(t)=\int_t^{t+\Delta} dt` S(t`)/\Delta$ (col. 11, equation 5), and the time-averaged data train is constructed at times $t = t_0, t_0 + \Delta, t_0 + 2\Delta,\ldots, t_0 + N\Delta$ (col. 8, lines 12-18).

In reference to claim 27, Prammer discloses the method of claim 26, further comprising the step of inverting of the constructed time-domain averaged data train into the T_2 domain (col. 9, lines 25-40) wherein the T_2 distribution is modeled using the expression $Echo_{\Delta}(t) = \Sigma_{T2} \phi (T_2) \exp(-t/T_2)(1-\exp(-\Delta/T_2)) + Noise$ (col. 10, equation 3).

In reference to claim 28, Prammer teaches the method of claim 26, further comprising the step of averaging two or more constructed time-domain averaged data trains to increase the signal-to-noise ratio of the measurement (col. 5, lines38-42; col. 11, lines 24-32).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 3, 12 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Prammer in view of U.S. Patent No. 6,163,153 to Reiderman et al.

In reference to claim 3, Prammer teaches the method of claim 1 but does not teach that at least two of said one or more time intervals Δ_i are different. However, Reiderman does teach that varying the duration of the time intervals. Reiderman discloses that doing so would be beneficial since one is still able to produce a maximum signal-to-noise ratio while minimizing the use of electrical power by the instrument (col. 7, lines 54-58). Therefore, it would have been obvious at the time of the invention to one of ordinary skill in the art to vary the time intervals in order to

minimize the power consumption of the device while maintaining a maximum signal-to noise ratio.

In reference to claim 12, Prammer teaches the method of claim 10 but does not teach that at least two of said one or more time intervals Δ_i are different. However, Reiderman does teach that varying the duration of the time intervals. Reiderman discloses that doing so would be beneficial since one is still able to produce a maximum signal-to-noise ratio while minimizing the use of electrical power by the instrument (col. 7, lines 54-58). Therefore, it would have been obvious at the time of the invention to one of ordinary skill in the art to vary the time intervals in order to minimize the power consumption of the device.

In reference to claim 20, Prammer teaches the method of claim 18 but does not teach that at least two of said one or more time intervals Δ_i are different. However, Reiderman does teach that varying the duration of the time intervals and therefore minimizes the use of electrical power of the device (col. 7, lines 54-58). As discussed previously, it would have been obvious at the time of the invention to one of ordinary skill in the art to vary the time intervals in order to still produce a maximum signal-to-noise ratio while minimizing the use of electrical power by the instrument.

Conclusion

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. U.S. Patent No. 5,517,115 to Prammer discusses processing NMR echo trains.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Emily J. Feick whose telephone number is (703)-305-4450. The examiner can normally be reached on Monday-Friday, 8:30-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Lefkowitz can be reached on (703)-305-4816. The fax phone numbers for the organization where this application or proceeding is assigned are (703)-305-3432 for regular communications and (703)-308-0956 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)-308-1782.

Emily J. Feick

EJF
June 3, 2002

EDWARD LEFKOWITZ
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